

Bioarchaeological Research in the Mariana Islands of the Western Pacific: An Overview

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Compared to the other ethno-geographic regions of Oceania, relatively little is known about the human biohistory of the island ecosystems occupying the vast expanse of the central and western Pacific known as Micronesia. Since 1987 when the First Micronesian Archaeology Conference (Hunter-Anderson, 1990) was held on Guam, the Marianas archipelago has been the focus of considerable archaeological research activity due to significant economic expansion in the region and the rapid pace of capital improvements, particularly on Guam, Rota, Tinian and Saipan.

The First Micronesian Archaeology Conference, which was a component of the 1987 Indo-Pacific Prehistory Association meetings, brought together scholars from around the world who had been doing archaeological and ethnoarchaeological research in Micronesia. At this conference, Pietrusewsky (1990) organized a single session devoted exclusively to the current status of bioanthropological research in Micronesia. Of the six papers presented at that session, only two focused exclusively on the Marianas and bioarchaeological research.

The nine papers in this issue represent a subset of a group of papers presented in a two-part symposium entitled "Prehistoric Skeletal Biology in Island Ecosystems: Current Status of Bioarchaeological Research in the Marianas Archipelago" at the 64th Annual Meeting of the American Association of Physical Anthropologists held in Oakland, California in 1995. Scholars from Japan, Guam, Australia, New Zealand, Hawaii, En-

gland, and the mainland U.S. presented nineteen contributed papers and posters at this symposium, most of which were based on archaeological data recovery efforts which had occurred in the Marianas since the 1987 conference. These papers represented a broad spectrum of research ranging from prehistoric mortuary patterns and paleodemography to work with stable isotopes and diet reconstruction, enamel hypoplasias, unique morphological variants of occipital bone, mtDNA analysis, spondylolysis, and an electron microscopic study of betel-staining.

For various reasons, many of these papers could not be published in this issue. Nevertheless, because of their importance to ongoing research in the region, most of these works have been cited in the accompanying papers. In general much of the ongoing bioarchaeological research in the Marianas is guided by three research domains: (1) biocultural responses to increasing population size and density in island ecosystems prior to European contact; (2) inter-island variation in these responses and their significance with respect to differences in subsistence, settlement and social complexity; and (3) individual and population adaptive responses to European contact and colonization.

The first paper by Hanson and Butler offers a broad overview to the Mariana Is-

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lands and includes a brief background to geomorphology and paleoclimatology, population history, and prehistory of the archipelago. The paper also highlights some of the bioarchaeological research problems currently under investigation. Hanson and Butler caution that since nearly all of the bioarchaeological research done in the Marianas is constrained by contract guidelines and the need to rebury human remains after analysis and report preparation is complete, it is important for the many different investigators involved in work with human remains to reach consensus on standards for data collection, analysis and reporting. This will be essential to the development of a regional synthesis for guiding future research efforts.

The paper by Douglas, Pietrusewsky and Ikehara-Quebral is particularly important because it represents the first published data on a sizeable sample ($n = 152$) of human remains from a single pre-contact Latte Period site (Apurguan) in the Marianas. The paper notes some of the difficulties of working with skeletal material from the Marianas due to differential preservation and the taphonomic and cultural factors affecting the completeness of individual skeletons. These authors summarize the paleodemographic characteristics, dental and skeletal morphology and paleopathology, including data on treponemal disease, for the Apurguan sample.

In the third paper, Pietrusewsky, Douglas and Ikehara-Quebral provide one of the first comprehensive, inter-island assessments of prehistoric community health and disease in the Marianas using mortuary samples ($n = 383$) recovered over a 15-year period from four of the major islands. Among the major findings were life expectancies at birth ranging from 26.4 years to 33.7 years, relatively high fertility rates, relatively tall stature, high frequencies of enamel hypoplasia, low frequencies of cribra orbitalia and dental pathologies, betel-stained dentitions, few healed fractures and high levels of spondylolysis. These authors note some distinctive differences in biological stress indicators between Guam and the islands of Rota, Tinian and Saipan where patterns of morbidity and mortality suggest greater exposure

to biological stress. This generally supports evidence from previously reported data from Rota and Saipan (Hanson 1988, 1989, 1990) where it was suggested that chronic shortages of potable water may be a key factor in the morbidity/mortality experienced by village populations in the islands north of Guam.

Ambrose et al. provide the most comprehensive stable isotope data to date for diet reconstruction in the Marianas. These data not only take into account a food web analysis but provide diet information based on carbon isotope ratios in apatite as well as carbon and nitrogen isotope ratios in bone collagen. Aside from inter-island differences in the proportions of marine and terrestrial resources in the diet, one of the more important findings is a previously unrecognized presence of significant amounts of seaweed or other C_4 plants in the diet such as sugar cane.

Using a sizeable sample of remains ($n = 293$) representing several Latte Period sites on Guam, Stodder's paper provides us with the first published quantitative data for the Marianas linking the biological stress events which cause linear enamel hypoplasias (LEH) to reduced life expectancy in subadults and young adults. The etiological age distribution of LEH in subadults and young adults suggests that biological stress to individuals aged 4 to 6.5 years may have a significant impact on overall life expectancy. Given the high population density in many of the Latte Period coastal villages of Guam, Stodder suggests that one of the primary factors contributing to the morbidity and mortality experience of these young children may have been chronic infection and reinfection associated with endemic treponematoses or yaws.

The paper by Ikehara-Quebral and Douglas focuses on several types of cultural modification observed in permanent teeth in the Marianas. Although modified teeth are relatively scarce overall, they do occur with some regularity in many of the mortuary samples studied. The observed variation consists of cross-hatched incising, diagonal and vertical incising, and linear abrasion/filing. Given their scarcity, the significance of these

purposeful dental modifications remains unclear.

Although spondylolysis has been observed regularly in mortuary samples studied throughout the Marianas, Arriaza's paper is the first to provide us with quantitative data on this condition based on a sample of complete spines recovered from a single site on Guam. Arriaza presents a frequency (21%) of L5 spondylolysis which is comparable to the observed frequencies in some Amerindian, Aleut and Eskimo populations. Arriaza suggests that the relatively high frequency of L5 spondylolysis in the Guam sample is related to community work patterns and activity levels associated with the construction of the megalithic latte structures on Guam.

The final two papers deal with biological origins and affinities of the Mariana Islanders (especially Guam) based on comparisons of skulls from the Pacific and circum-Pacific region. The paper by Ishida and Dodo, using cranial non-metric traits, including aspects of facial flatness, demonstrates a biological closeness between the Mariana Islanders and Polynesians, who together have more in common with peoples of Southeast Asia and East Asian than with Jomon and Ainu. This latter finding runs counter to work by Brace and colleagues (e.g. Brace et al., 1989; Brace and Hunt, 1990) who have long championed a Jomon-Pacific connection.

In the last paper, Hanihara applies multivariate statistical procedures to cranial measurements recorded in skulls originating from the Mariana Islands and other parts of the Pacific and Asia. The results of his study broadly parallels the findings of previous papers and earlier studies of skulls and teeth (see e.g., Pietrusewsky, 1990a; 1990b) which have shown that Micronesians and Polynesians are more similar to one another and to Southeast Asians than with populations of ancient Melanesia.

Among the many recommendations issued at the First Micronesian Archaeology Conference held on Guam in 1987 was the

hope that larger and better provenienced samples of human remains from Micronesia and the Marianas in particular, would become available for future research in bioarchaeology and skeletal biology. Given the large number of papers presented at the symposium devoted exclusively to Marianas bioarchaeology and as the selection of papers in this issue indicates, the ensuing decade has witnessed not only a remarkable increase in the numbers of well-documented skeletal assemblages, but also vigorous efforts by a handful to scholars to bring to focus patterns of prehistoric community health and disease in island peoples from this long-neglected region of the Pacific. If the past ten years serves as an example, the next ten years should provide a wealth of new data on the unique biological heritage of these peoples as our discipline matures.

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